

## **CARRIAGE MODULE FOR SCANNER**

### **Field of the invention**

The present invention relates to a carriage module for scanner, especially to a carriage module for scanner to reduce the size of the scanner without  
5 reducing focus length of the scanner.

### **Background of the invention**

The scanners are widely used for converting paper document to computer-accessible data. The carriage module is the essential component of the scanner and under extensive research.

10 However, the current scanner generally uses lens with lager focus length to provide fast scanning operation. Therefore, the scanner and carriage module using fixed mounting unit generally have bulk size.

### **Summary of the invention**

It is an object of the present invention to provide a carriage module for  
15 scanner to reduce the size of the scanner without reducing focus length of the scanner. The carriage module comprises a case composed of two shells, wherein one shell is movably arranged on the other shell and can be telescoped into the other shell, whereby the overall size of the carriage module can be reduced.

20 To achieve above object, the present invention provides a carriage module for a scanner, which comprises a case, an image sensor, a mirror set and a lens set. The image sensor, the mirror set and the lens set are arranged in the case. Moreover, the mirror set is used to guide a reflected light from a document to be scanned to the image sensor. The lens set is used to focus the reflected light

from the document to the image sensor. The image sensor is used to convert the reflected light to an electrical counterpart. The case composed of a first shell and a second shell with a larger length than that of the first shell. The second shell is movably arranged in the first shell and can be moved along a horizontal direction. Therefore, the second shell can be advantageously telescoped into the first shell to achieve above object.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing, in which:

#### **Brief description of drawing:**

Fig. 1 shows the sectional view of the inventive carriage module for scanner in a first scanning position; and

Fig. 2 shows the sectional view of the inventive carriage module for scanner in a second scanning position.

#### **Detailed description of the invention**

Figs. 1 and 2 show the sectional view of the inventive carriage module for scanner in a first scanning position and a second scanning position, respectively. The inventive carriage module for scanner comprises a case 1, an image sensor 2, a mirror set 3 and a lens set 4.

The case 1 forms an outer structure of the inventive carriage module and is placed within an outer casing 5. Upon receiving a scanning command, the case 1 is moved from a first scanning position within the outer casing 5 as shown in Fig. 1 to a second scanning position within the outer casing 5 as shown in Fig. 2, whereby the carriage module scans a document 50 on the outer

casing 5. Moreover, a light source 10 is placed atop the case 1 to provide illuminating light for the document 50.

The image sensor 2, for example, is a charge coupled device (CCD) and is functioned to convert a reflected light 51 from the document 50 to an electrical counterpart (signal).

The mirror set 3 comprises a first reflection mirror 30, a second reflection mirror 31, a third reflection mirror 32, a fourth reflection mirror 33 and a fifth reflection mirror 34, and is placed within the case 1. The mirror set 3 is functioned to guide the reflected light from the document 50 to the image sensor 2.

The lens set 4 comprises a lens 40 and a focusing unit 41. The lens 40 is placed between the image sensor 2 and the mirror set 3 and used to focus the reflected light from the document 50 to the image sensor 2. The focusing unit 41 is used to refocus the reflected light. The distance of the reflected light 51 propagating from the document 50 and through the first reflection mirror 30, the second reflection mirror 31, the third reflection mirror 32, the fourth reflection mirror 33 and the fifth reflection mirror 34 and to the lens 40 is defined as optical path of the carriage module.

In the present invention, the case 1 is composed of a first shell 11 and a second shell 12. The case 1 is characterized in that the second shell 12 is movably arranged in the first shell 11 and can be moved along horizontal direction. The second shell 12 has a larger horizontal length ( $A+B$  or  $C+D$ ) than that of the first shell 11 ( $A+C$ ).

As shown in Fig. 1, when the case 1 is placed at the first scanning position,

the left side of the second shell 12 abuts to the left inner wall of the outer casing 5 or to a stopper 52 on the left inner wall of the outer casing 5. At this time, the left side of the second shell 12 is telescoped into the left side of the first shell 11 and the right side of the second shell 12 is projected out of the right side of the first shell 11. Upon receiving a scanning command, the case 1 is moved from the left side of the outer casing 5 to the right side of the outer casing 5 as shown in Fig. 2 to scan the document 50.

As shown in Fig. 2, when the case 1 is moved to the scanning position within the outer casing 5, the right side of the second shell 12 abuts to the right inner wall of the outer casing 5 or to a stopper 53 on the right inner wall of the outer casing 5. At this time, the right side of the second shell 12 is telescoped into the right side of the first shell 11 and the left side of the second shell 12 is projected out of the left side of the first shell 11. Moreover, the scanning of the document 50 is completed then.

More particularly, the second shell 12 can be telescoped into the right side or the left side of the first shell 11 during scanning operation. Therefore, the occupying space of the case 1 during scanning operation can be reduced by moving horizontally the second shell 12 while the focus length is not sacrificed.

Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have suggested in the foregoing description, and other will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended

claims.